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CONTENTS

Alexander—New exotic crane-flies. Part III 113

Scott—Collembola from Japan. Part III 121

Hays—Tabanus aranti sp. nov. from Alabama 127

Emerson and Elbel—A new species of Rallicola 130

Hubbard—Fleas from kangaroo rats of N. California 133

Obituaries 132, 139

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ENTOMOLOGICAL NEWS

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New Exotic Crane-Flies (Tipulidae: Diptera). Part III

By CHARLES P. ALEXANDER, Amherst, Massachusetts [1]

The preceding part under this general title was published in ENTOMOLOGICAL NEWS, 71: 237–243, 1960. At this time I am describing species from various parts of India, all belonging to the extensive genus *Hexatoma*. The specimens were collected by Dr. Fernand Schmid, to whom I am greatly indebted for many crane-flies from various parts of southern Asia.

Hexatoma (Hexatoma) madrasensis new species

Size small (wing of female 5.5 mm.); general coloration of mesonotum medium brown, praescutum glabrous; wings weakly tinged with brown, without stigma; veins unusually glabrous; Sc_1 ending some distance before fork of Rs, R_2 close to fork of R_{2+3+4}, *m-cu* at fork of M.

♀. Length about 5 mm.; wing 5.5 mm.; antenna about 0.8 mm.

Rostrum and palpi light brown, much reduced. Antennae of female 6-segmented, light brown; first flagellar segment stout basally, gradually tapering to outer end, subequal in length to the succeeding two segments, with delicate pale setae additional to the scattered bristles, the latter longer and more evident on the outer segments. Head dark brown; vertical tubercle large, entire.

[1] Contribution from the Entomological Laboratory, University of Massachusetts.

Mesonotal praescutum and scutum uniformly medium brown, the surface subnitidous, glabrous; posterior sclerites of notum a trifle paler. Pleura light brown, vaguely darker on the anepisternum and ventral sternopleurite. Halteres infuscated, knob large. Legs with coxae and trochanters testaceous brown; remainder of legs yellowish brown, with relatively short setae. Wings weakly tinged with brown, the prearcular and costal fields a trifle more yellowed; stigma lacking; veins pale brown. Veins unusually glabrous, beyond the cord with about five macrotrichia on distal section of R_5, distributed over the entire length. Venation: *Sc* relatively short, Sc_1 ending some distance before fork of *Rs;* R_{2+3+4} long, with R_2 at or close to fork; veins R_3 and R_4 divergent, cell R_3 at margin only a little less extensive than R_2; outer medial veins weak; *m-cu* at fork of *M*, a little shorter than distal section of Cu_1.

Abdominal tergites dark brown, sternites somewhat more brightened on central part. Ovipositor with valves only moderately developed, with setae virtually to their tips.

Habitat. SOUTH INDIA. *Holotype:* ♀, Veraiyattu Tittu, Madras, 1,500 feet, December 21, 1958 (Fernand Schmid).

This is the first record of occurrence of the typical subgenus in south India. The species is quite distinct from the species known from the western Himalayas, being somewhat more like *Hexatoma* (*Hexatoma*) *brevistigma* Alexander, of Thailand. This differs especially in the venation and pattern of the wings, including the evident stigmal area, longer *Sc*, and position of vein R_2 well beyond the fork.

Hexatoma (Eriocera) perlongata new species

Size medium (wing 11 mm.); antennae short; vertical tubercle orange, very large, bilobed; thorax brownish black, scutellum obscure yellow; halteres and legs black, femoral bases broadly yellowed; wings infuscated, base conspicuously yellow; *Rs* very long, R_2 before the fork, cell M_2 open by atrophy of *m*; abdomen yellowed, hypopygium black.

♂. Length about 10 mm.; wing 11 mm.; antenna about 1.7 mm.

Rostrum obscure yellow, palpi black. Antennae of male 7-

segmented; scape obscure yellow, remainder dark brown; first flagellar segment longer than the succeeding two combined, with subappressed black setae; penultimate segment a trifle exceeding the antepenultimate and about twice the terminal one. Vertex brown posteriorly, summit with a very large orange enlargement, depressed medially in front, forming two conspicuous lobes that are directed cephalad.

Prothorax, mesonotum and scutal lobes brownish black, surface subnitidous, praescutum with sparse delicate setae; scutellum obscure yellow, parascutella and postnotum brownish black. Pleura blackened. Halteres black. Legs with coxae testaceous brown; trochanters yellow; femora black, their bases broadly yellow, including about the basal half on fore and middle legs, approximately two-thirds to three-fourths on posterior pair; tibiae and tarsi black, proximal tarsal segments a little paler. Wings strongly infuscated, wing base and most of cell *Sc* yellowed; pale streaks in centers of certain cells, especially, R_1 and R_4; a narrow more whitened line in cell *1st A* immediately behind the posterior half of vein. Veins beyond cord with abundant strong macrotrichia, basad of cord on outer half of *Rs*, outer third of *M* and a few near outer end of *1st A*. Venation: *Sc* relatively short, Sc_1 ending before fork of *Rs*, Sc_2 near its tip; *Rs* very long, at least one-half longer than *R*; R_2 before the radial fork, leaving a short element R_{3+4}; R_{1+2} subequal to R_2; cell M_2 open by atrophy of *m*, cell M_3 longer than its petiole; *m-cu* just beyond the fork of *M*.

Abdomen partly destroyed by insect pests; first segment dark brown, intermediate ones obscure yellow; hypopygium and possibly some adjacent segments black.

Habitat. SIKKIM. *Holotype:* ♂, Bop, 5,950 feet, July 15, 1959 (Fernand Schmid).

Hexatoma (*Eriocera*) *perlongata* is a very distinct fly, especially in the venation, as the elongate *Rs*, position of R_2 and open cell M_2. *H.* (*E.*) *dharma* Alexander, of South India, has cell M_2 open by atrophy of basal section of M_3, differing further in all details of coloration and in other venational features, as the short *Rs* and position of vein R_2 beyond the radial fork.

Hexatoma (Eriocera) vamana new species

Belongs to the *longicornis* group; size unusually small (wing of male less than 7 mm.); antennae of male about three times the body; general coloration of thorax dark brown, abdomen black; wings suffused with brown, macrotrichia of veins very sparse; R_2 longer than R_{1+2}, before the radial fork, leaving an element R_{3+4}; veins R_3 and R_4 divergent, cell R_3 wide at margin; *m-cu* at near one-third the length of M_{3+4}.

♂. Length about 5.5 mm.; wing 6.8 mm.; antenna about 18 mm.

Rostrum and mouthparts very reduced, brown; palpi short, black. Antennae of male 6-segmented, very long, approximately three times the body; scape large, brownish yellow; remainder of organ brown, passing into black outwardly; flagellar segments very long, progressively lengthened outwardly; emergence bristles small and scattered, on the outer segments more delicate and hairlike. Head medium brown; vertical tubercle glabrous, large and bulbous, entire.

Pronotum brown. Mesonotum almost uniformly dark brown; praescutal setae long but very sparse. Pleura dark brown. Halteres infuscated, paler at base, knob dark brown. Legs with coxae dark brown; trochanters brownish yellow; remainder of legs dark brown; setae of legs long but sparse (posterior legs broken). Wings suffused with brown, stigmal region vaguely darker; veins brown, outer medial veins pale and delicate. Macrotrichia of veins beyond cord very sparse, with few on R_1 and only two or three at outer end of R_5; costal fringe short. Venation: R_2 nearly twice R_{1+2} and slightly longer than R_{3+4}; veins R_3 and R_4 divergent, cell R_3 at margin slightly more extensive than cell R_2; cell *1st* M_2 subequal in length to distal section of vein M_{1+2}; *m-cu* at near one-third the length of M_{3+4}, longer than distal section of Cu_1; cell *2nd A* relatively narrow.

Abdomen, including hypopygium, black.

Habitat. SOUTH INDIA. *Holotype:* ♂, Sathupara, Madras, 1,500 feet, December 1, 1958 (Fernand Schmid).

Hexatoma (*Eriocera*) *vamana* is readily told from other regional members of the *longicornis* group by the small size and venation of the radial field. The specific name, *vamana,* is that of the dwarf incarnation of Vishnu in Hindu mythology.

Hexatoma (Eriocera) gnava new species

Belongs to the *longicornis* group; general coloration of thorax brownish gray, praescutum with four brown stripes; antennae of male very long, 6-segmented; legs obscure yellow, posterior tibiae with long pale setae; wings weakly darkened, stigma pale brown, veins glabrous; R_{1+2} and R_2 subequal, R_{2+3} about three times R_2; valves of ovipositor short and fleshy.

♂. Length about 8–9 mm.; wing 10–11 mm.; antenna about 32–36 mm.

♀. Length about 8–8.5 mm.; wing 10–10.5 mm.; antenna about 1.7 mm.

Rostrum reduced, light brown; palpi very small, black. Antennae of male greatly lengthened, approximately three times the wing; proximal three or four segments yellowish brown, outer segments passing into black; organ apparently 6-segmented, with the terminal segment very long, only a little shorter than the remainder of organ; basal three flagellar segments with small scattered emergence bristles, these becoming more scattered on outer segments, with still fewer and smaller setae on the terminal segment; scape very large, pedicel correspondingly reduced; in female, antennae short, if bent backward not reaching the wing root, apparently 6-segmented. Head chestnut brown, more pruinose behind; vertical tubercle of male very large and tumid, entire, provided with long pale setae on posterior aspect; a blackened area on anterior face behind the scape; tubercle of female much smaller.

Pronotum brownish gray. Mesonotal praescutum brownish gray with four brown stripes, the intermediate pair well separated; posterior sclerites of notum brownish gray, scutal lobes patterned with darker; notal vestiture very abundant, white, erect. Pleura chiefly dark brown, sparsely pruinose, pleuro-

tergite with white setae; dorsopleural membrane darker. Halteres with stem faintly darkened, knob dark brown. Legs with coxae light brown; trochanters brownish yellow; femora obscure yellow, tibiae and tarsi slightly darker; posterior tibiae with abundant long pale setae. Wings weakly darkened, stigma pale brown, ill-delimited; veins dark brown, those of the costal and prearcular fields yellowed. Veins glabrous, beyond cord with a complete but scattered series of small macrotrichia on distal section of R_5; no trichia on R, R_1 or Sc except a very few on R_1 in the stigmal area; costal fringe of male short but dense. Venation: R_{1+2} subequal to or a little longer than R_2, the latter about one-third R_{2+3}; *m-cu* shortly beyond fork of M.

Abdomen, including hypopygium, dark brown, basal tergites a trifle paler. Ovipositor with valves short and fleshy, as in typical *Hexatoma*.

Habitat. WEST INDIA. *Holotype:* ♂, Sykes, Bombay, 2,000 feet, February 5, 1959 (Fernand Schmid). *Allotopotype:* ♀, pinned with the type. *Paratopotypes:* 1 ♂, 3 ♀♀.

The closest regional ally of the present fly is the Javanese *Hexatoma* (*Eriocera*) *verticalis* (Wiedemann) which differs in coloration of the body and wings and in the venation, especially of the radial field. The present fly presumably is the same species that was recorded from Pusa, Bihar, India by Brunetti (Rec. Indian Mus., 15: 333, 1918).

Hexatoma (Eriocera) artifex new species

Size medium (wing of male 10 mm.); mesothorax black, the notum more opaque, with a large fulvous area on the dorsopleural membrane; legs black, femoral bases narrowly yellowed; wings yellowed, the costal border and seams over virtually all veins brown; cell M_1 lacking; abdomen dull black, vaguely pruinose, second segment chiefly yellow.

♂. Length about 10 mm.; wing 10 mm.; antenna about 2 mm.

Rostrum black, gray pruinose; palpi black. Antennae of male 6-segmented, black, the scape pruinose; first flagellar segment about one-sixth longer than the second, with strong setae, especially beneath; bristles of succeeding segments few and

scattered. Head black, gray pruinose, opaque; vertical tubercle low and rounded.

Entire thorax black, surface of notum nearly opaque, of pleura more polished and clearer black; a large fulvous area on the dorsopleural region above the anepisternum; praescutal vestiture very small and sparse. Halteres black. Legs black, coxae polished; femoral bases narrowly but conspicuously yellow (fore legs broken). Wings with the ground yellowed, much restricted by infuscations in the costal region and as seams over all the veins, the latter more extensive in the outer radial field, least so on basal half of vein M; wing base more yellowed, including the veins, remaining veins dark brown. Veins beyond cord with strong macrotrichia, fewer on R_{2+3+4} and basal section of R_5, lacking on the two proximal sections of M_{1+2}, M_{3+4} and Cu_1; strong trichia on Sc for most of its extent. Venation: Sc relatively long, Sc_1 ending about opposite *r-m*; R_{2+3+4} about twice the basal section of R_5 or more than twice R_{1+2}; R_2 beyond the fork, R_{2+3} short; cell M_1 lacking but this probably a variable character since the left wing of the unique type shows a marginal remnant in cell R_5 that seems undoubtedly to represent a fragment of M_1; *m-cu* at or beyond midlength of M_{3+4}.

Abdomen dull black, vaguely pruinose; much of second segment yellowed, on the sternites this vaguely involving the centers of segments three and four; hypopygium black.

Habitat. SOUTH INDIA. *Holotype:* ♂, Swamp Hill, Madras, 7,500 feet, December 13, 1958 (Fernand Schmid).

The nearest relative of the present fly is *Hexatoma* (*Eriocera*) *atrodorsalis* (Alexander), likewise from South India, which differs especially in the coloration of the body and the presence of cell M_1. It should be emphasized that this latter character may prove to be variable in both of these species.

Hexatoma (Eriocera) vulpes new species

Belongs to the *dichroa* group; size large (wing of male over 15 mm.); general coloration fulvous or yellow; head with a conspicuous vertical tubercle; mesonotal praescutum with four fulvous stripes; legs obscure yellow; wings strongly tinged with

fulvous yellow, veins yellow, cell M_1 present; abdomen yellow, the hypopygium darker.

♂. Length about 20 mm.; wing 16.5 mm.; antenna about 3.4 mm.

♀. Length about 20 mm.; wing 14 mm.; antenna about 3 mm.

Rostrum obscure yellow; palpi brownish black. Antennae short in both sexes, 8-segmented; scape and pedicel brown, the former more yellowed beneath, flagellum brownish black; flagellar segments with long coarse setae; first flagellar segment shorter than the succeeding two segments combined. Head dark gray, the conspicuous slender porrect vertical tubercle more blackened, with a second smaller knob immediately cephalad; vestiture of head black, abundant.

Pronotum brownish yellow. Mesonotal praescutum with the restricted ground light brownish gray, with four fulvous stripes that are narrowly bordered by reddish brown, the intermediate pair separated by a capillary line, black in front, paling to brown behind; praescutal vestiture erect, delicate; scutal lobes similarly fulvous, its central area and the scutellum more testaceous; postnotum, including the mediotergite and posterior half of pleurotergite, more yellowed; remainder of the latter, with the pleura, slightly darker, especially above, ventral sternopleurite yellowed. Halteres brownish black, base of stem restrictedly brightened. Legs with coxae reddish, sparsely gray pruinose; trochanters brownish yellow; femora obscure yellow, the tips very narrowly more darkened above; tibiae and tarsi obscure yellow, the last tarsal segment darkened; claws of male with a strong basal spine, in female this smaller and more obtuse. Wings long and narrow, with a strong fulvous brown tinge, more saturated along costal border; stigma lacking; veins yellow, involving the restricted adjoining membrane, more conspicuous on anterior half of wing. Veins of outer radial field, together with M_1 and M_2, with abundant short macrotrichia, sparse or lacking elsewhere. Venation: Sc long, Sc_1 ending just beyond R_2, Sc_2 a short distance from its tip; R_{2+3+4} slightly longer than basal section of R_5 or R_{2+3}; R_{1+2} subequal to R_{2+3+4}; cell M_1 subequal to its

petiole; cell *1st* M_2 small, subrectangular, with *m-cu* at or beyond midlength; vein *2nd A* long, sinuous.

Abdomen yellow, narrowly darkened laterally; hypopygium more infuscated; segments without differentiated shiny basal rings. Ovipositor with cerci long and very slender.

Habitat. SOUTH INDIA. *Holotype:* ♂, Kuttalam, Madras, 500–2,000 feet, November 23, 1958 (Fernand Schmid). *Allotype:* ♀, Krishnappanayakkan, Madras, 1,200 feet, November 30, 1958 (Fernand Schmid).

By Edwards's key to the Old World species of the subgenus *Eriocera* (1921), the present fly runs to couplet 42 where it disagrees with all succeeding species in its coloration, being most similar to *Hexatoma* (*Eriocera*) *ferruginosa* (van der Wulp) of Java. This latter fly is quite distinct in all details of coloration and venation.

Collembola from Japan. III. Hypogastrurinae and Neanurinae [1]

By HAROLD GEORGE SCOTT [2]

This paper records six species of springtail insects collected by Captain John E. Scanlon [3] while with the 406th Medical General Laboratory (U. S. Army) in Japan. Specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Subfamily HYPOGASTRURINAE Borner, 1906

Hypogastrura armata (Nicolet, 1841).

The Scanlon specimens show the traits which caused Oriental individuals of the species to be designated *H. communis* (Fol-

[1] Part II appeared in Ent. News, 70(9): 241–243.

[2] Training Branch, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta, Georgia.

[3] Medical Service Corps, U. S. Army. Present address: Entomology Department, Walter Reed Army Medical Center, Washington, D. C.

som, 1897). However, I follow Stach (1949, p. 131) in considering *H. communis* a variant of *H. armata*.

ADDITIONAL JAPANESE RECORD. Seven specimens, soil from rodent burrow, 23–x–1952, Shizuoka, Subashiri, Honshu, JAPAN, by J. E. Scanlon. This species was first recorded from Japan by Folsom (1897).

DISTRIBUTION. Holarctic, Neotropical, Australasian.

Hypogastrura ununguiculata (Tullberg, 1869).

JAPANESE RECORD. Five specimens, rodent nest, 7–iii–1952, Tokyo, Honshu, JAPAN, by J. E. Scanlon. This species has not been recorded previously from Japan.

DISTRIBUTION. Holarctic.

Hypogastrura japonica sp. nov. Figure 1.

TYPE COLLECTION. Three specimens, soil from rodent burrow, 23–x–1952, Shizuoka, Subashiri, Honshu, JAPAN, by J. E. Scanlon.

DESCRIPTION. Body elongate, not subglobose, segmentation distinct; setae present, scales and pseudocelli absent; integument minutely granular; color light brown mottled with blue, legs pale brown, fore part of head and antennae heavily mottled with blue; head prognathous; mouthparts chewing, mandible with molar surface; ant III and IV semiconfluent, without eversible sac between them; ant IV tip with sensory seta; ant III sense organ with rods, no cones; postantennal organ with 4 peripheral tubercles, 1 much smaller than other 3; eyes 8 and 8 on dark eyepatches; pronotum not reduced, setaceous, of same texture as other body segments; unguiculus present, about $\frac{2}{3}$ unguis; unguis and unguiculus without teeth; tenent hairs absent; collophore sacs smooth, small; furcula not ankylosed, reaching almost to collophore; dental thorns absent; mucro spoon-shaped, without teeth; anus terminal; anal spines 2, strongly curved, each about length of hind unguis; body length about 1.2 mm.

DIAGNOSTIC CHARACTERISTICS. This species is clearly a member of the subgenus *Neogastrura* (*sensu* Stach, 1949, p.

19). It may be distinguished from all other members of that group by the absence of dental thorns and of tenent hairs.

NOTE. Although data are identical, specimens of *H. japonica* sp. nov. did not come from the same collection as those of *H. armata*.

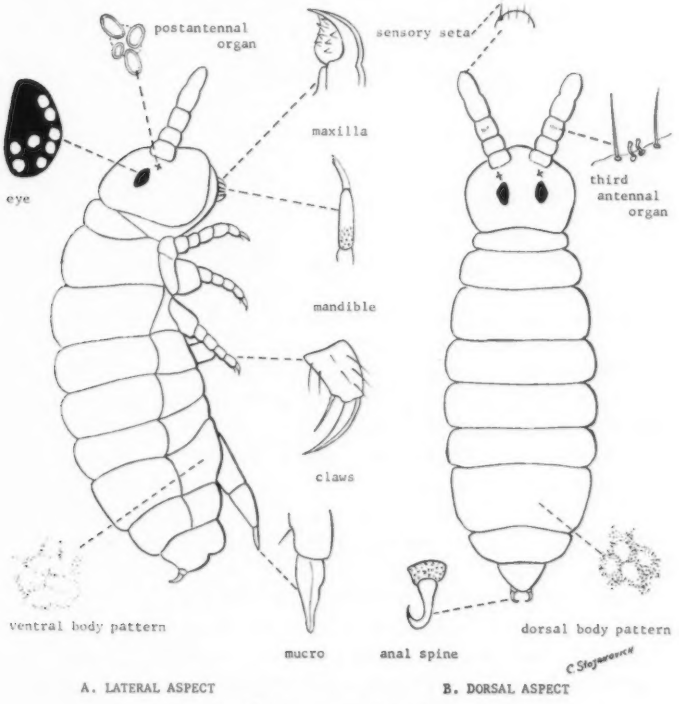

FIG. 1. *Hypogastrura japonica* sp. nov.

Subfamily NEANURINAE Borner, 1901

Protanura aphoruroides Yosii, 1953.

ADDITIONAL JAPANESE RECORD. One specimen, soil from rodent burrow, 23–x–1952, Shizuoka, Subashiri, Honshu,

JAPAN, by J. E. Scanlon. This species was first recorded from Japan by Yosii (1953).

DISTRIBUTION. Japan.

Neanura ornata Folsom, 1902.

JAPANESE RECORD. Three specimens, rodent nest, 19–iii–1952, Akabane, Honshu, JAPAN, by J. E. Scanlon. This species has not been recorded previously from Japan.

DISTRIBUTION. Japan, Alaska, Siberia.

Neanura pseudornata sp. nov. Figure 2.

TYPE COLLECTION. Three specimens. Berlese funnel sample of soil, bamboo grove in woods, 677 meters altitude, 20–vi–1952, Beppu, Oita Ken, Kyushu, JAPAN, by J. E. Scanlon.

DESCRIPTION. Body elongate, not subglobose, segmentation distinct; setae present, scales and pseudocelli absent; integument minutely granular with large reticulated segmental tubercles (head, 11; thorax, 6–8–8; abdomen, 6–8–8–6–4–2); color yellow speckled with brownish-purple, legs darker than rest of body; head prognathous, wider than long, rounded triangular; head tubercles not coalesced; mouthparts suctorial, projecting in a cone; mandible without molar surface; head of maxilla needle-like, without lamellae or teeth; antenna longer than head, segments distinct; ant IV conical; ant III sense organ with sense-rods, without cones or papillae; postantennal organ absent; eyes pigmented, 3 and 3, not on dark eyepatches; pronotum not reduced, setaceous, of same texture as other body segments; unguiculus absent; unguis without teeth; tenent hairs absent; collophore sacs smooth; furcula absent; anal segment large; supra-anal valve bilobed; anal spines absent; body length about 1.1 mm.

DIAGNOSTIC CHARACTERISTICS. This species is close to *Neanura ornata* Folsom, 1902. It may be distinguished from *N. ornata* and other known *Neanura* by the following combination of characters: (1) head wider than long; (2) eyes 3 and 3, pigmented; (3) head tubercles not coalesced.

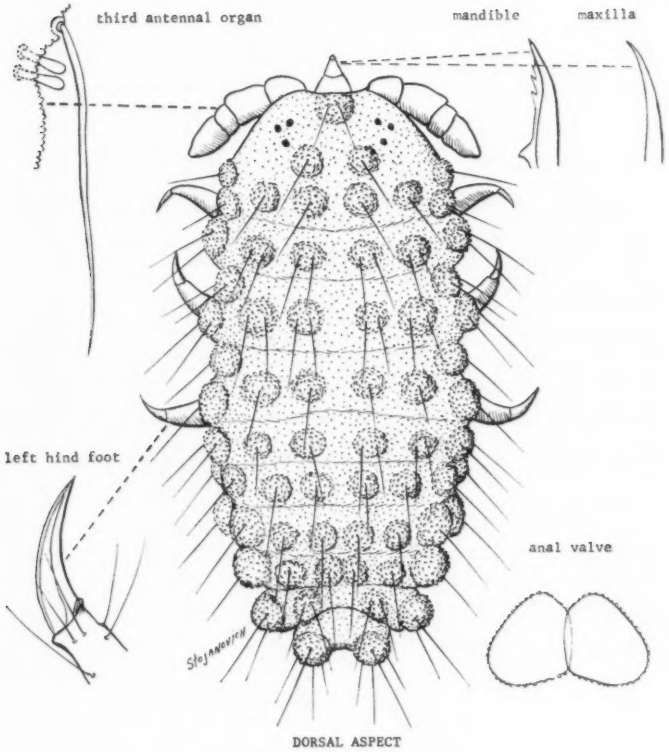

FIG. 2. *Neanura pseudornata* sp. nov.

SUMMARY

Hypogastrura armata, H. ununguiculata, H. japonica sp. nov., *Protanura aphoruroides, Neanura ornata,* and *N. pseudornata* sp. nov., are reported from Japan. Of these, only *H. armata* and *P. aphoruroides* have been recorded previously from the country.

JAPANESE SUMMARY

(Prepared by Dr. Nobuo Sakurai, Department of Bacteriology, School of Medicine, University of Chiba, Chiba, Japan.)

6種の springtail 昆虫が日本より記録される、すなわち; Hypogastrura armata (齧歯類の土穴, 静岡県, 須走, 本州); H. ununguiculata (齧歯類の巣, 東京, 赤羽本州); H. japonica sp. nov. (齧歯類の土穴, 静岡県, 須走, 本州); Protanura aphoruroides (齧歯類の土穴, 静岡県, 須走本州); Neanura ornata (齧歯類の土穴, 東京, 赤羽, 本州); N. pseudornata sp. nov. (竹やぶの土, 大分県, 別府, 九州)。これらのうち, H. armata (= H. communis) および P. aphoruroides のみがこれまで日本より記録されていた。

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Tabanus aranti sp. nov. (Diptera: Tabanidae) from Alabama

By Kirby L. Hays, Department of Zoology-Entomology, Auburn University, Auburn, Alabama

The attacks of Tabanidae (horseflies and deerflies) upon cattle present a serious problem in certain sections of Alabama. In 1960, the Auburn Agricultural Experiment Station began a project concerning the ecology and control of these insects. During the spring of 1960, tabanid larvae were collected and 14 species were reared to adulthood. One of these species appears to be undescribed. It is here proposed that this species be called *Tabanus aranti*.. The writer wishes to thank C. B. Philip of Hamilton, Montana, for consultation relative to the identity of this species.

Tabanus aranti sp. nov. (Fig. 1)

Large; black, with bluish pruinosity; wing darkened, darker along veins; basal callus higher than wide, median callus narrowly joined to basal callus; subcallus pollinose.

Holotype Female.—Length 22 mm. Nine paratype females vary in length from 15 to 22 mm. Eye bare. Frons 4–4½ times as high as wide, slightly widened above, grayish, darkened at vertex and laterad from median callus. Basal callus higher than wide, black, shiny, and not touching the eyes. Median callus a narrow concolorous line, not widened at juncture with basal callus. Subcallus wrinkled, flatter in profile than *T. wiedemanni,* dark brown pollinose. Clypeus and genae dark brown pollinose with blackish brown hair. Antennae black, first two segments with black hair, third segment black (sometimes reddish tinged basally) with a prominent dorsal angle and deep dorsal excision; annulate portion shorter than basal width. Second palpal segment black with black hair, sharper than palpi of *T. wiedemanni,* moderate in width.

Dorsum and venter of thorax blackish sometimes tinged with red, thin bluish pruinosity anteriorly; hair black. Legs black with concolorous hair. Wings darkened, darker along veins; venation normal. Halteres black, light distally.

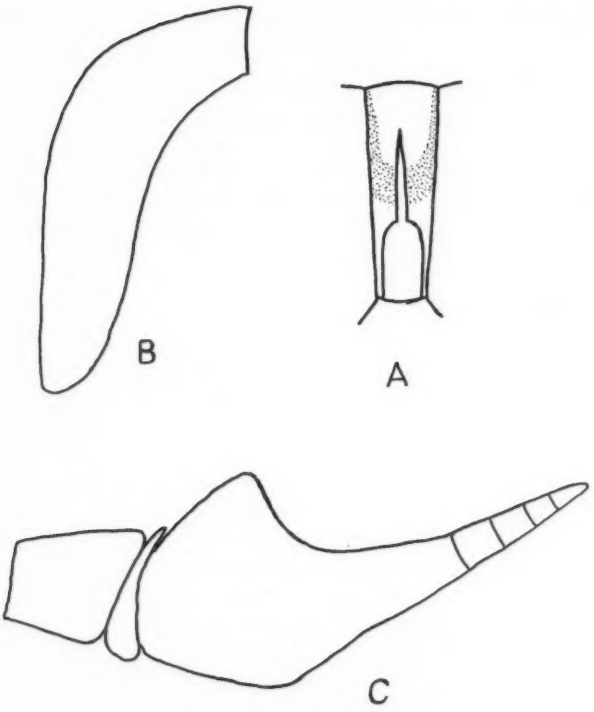
Dorsum and venter of abdomen black with bluish pruinosity.

Allotype Male.—Length 17 mm. Paratype males vary from 16 to 20 mm. Like the female except the bluish pruinosity is almost absent and the usual sexual differences. Head as wide or wider than thorax. Enlarged facets of eyes less extensive than in *T. wiedemanni.* Tubercle at vertex distinct, ovoid and slightly raised above the level of the eyes, reddish brown in color. Frontal triangle brownish pollinose, darker brown at the apex. Antennae brownish with black hairs, all portions more slender than in the female; annulate portion of third segment longer than basal width. Terminal palpal segment over 2 times as long as wide, blunt apically. Internal claw of fore tarsus shorter than external. Bluish pruinosity of abdomen much more sparse than in the female.

Type Material: Holotype female collected by the author at Auburn, Alabama, June 23, 1958. The allotype, nine paratype females, and eight paratype males were reared from larvae collected from the edge of a small pond on the North Auburn Dairy Research Unit at Auburn, Alabama. All reared material emerged between May 20 and 30, 1960, and are pinned with the pupal case. The holotype was collected on the wing and is believed by the author to best represent the natural characteristics of the species.

The holotype and allotype are deposited in the University of Michigan Museum of Zoology. Male and female paratypes are deposited in the collections of the U. S. National Museum, C. B. Philip, and L. L. Pechuman. The remainder of the material is in the collections of the author. Named for F. S. Arant, a colleague and 1961 President of the Entomological Society of America.

The species appears close to *T. wiedemanni* O. S., but is distinctly larger; median callus, narrow, not widened at juncture with basal callus and with a bluish pruinosity on the body in the female. The male has less extensive areas of large facets of the eye and averages larger in size. The species is also close to *T. nigrescens atripennis* and may be separated from it by the bluish pruinosity of the abdomen, a slightly narrower median callus and less red on the base of the third antennal segment in the female.



Tabanus aranti n. sp., holotype
A. Front, B. Palpus, C. Antenna.

Natural History: The large larvae of this species were collected in the organic ooze common along the shallow edges of southern farm ponds. Cattails and sedges grew in clumps in the vicinity. The edge of the pond was shaded by loblolly pine and sweet gum trees in the late morning and afternoon. No larvae were found in similar unshaded areas around the edges of the same pond. The larvae moved into drier, litter-covered soil and formed a cell somewhat larger than the larva and pupated. The period of pupation was 9 to 12 days.

A New Species of Rallicola (Mallophaga) from Southeast Asia.

By K. C. EMERSON, Stillwater, Oklahoma, and
ROBERT E. ELBEL, Lawrence, Kansas

A new species of the genus *Rallicola* is herewith described from specimens in the United States National Museum and the British Museum (Natural History), and the probable host for another species is indicated.

Rallicola indicus n. sp.

Male. Head as in figure 1. Posterior margin of pterothorax with 3–2–2–3 long setae. Second (first apparent) abdominal tergite interrupted medianly, the remainder transversely continuous. Tergites II–VIII, each with a pair of setae located medianly on the posterior margin. Terminal tergite with 3 long setae on each side. Chaetotaxy of paratergites: II–1, III–IV–2, and V–VIII–3. Abdominal sternites II, VII and VIII, each with 2 long setae; and III, IV, V, and VI, each with 6 long setae. Terminal abdominal segment bilobed with 8 short setae ventrally on each lobe. Genitalia as shown in figure 2.

Female. Head, except for filiform antennae, as in the male. Pterothorax as in the male. Abdominal tergites II–VIII interrupted medianly, chaetotaxy as in the male. Chaetotaxy of paratergites as in the male. Chaetotaxy of abdominal sternites: II–III–2, and IV–VI–8. Genital plate with 3 long setae on each side. Posterior margin of vulva with 24 short spines and 28 short setae. Terminal sternite with 16 long lateral setae and 3 genital setae on the tubercle on each side.

Measurements	Male	Female
Length of head	0.55 mm.	0.55 mm.
Width of head	0.41	0.44
Width of prothorax	0.27	0.27
Width of pterothorax	0.37	0.41
Width of abdomen	0.55	0.63
Total length	1.81	2.10

Diagnosis. This form is closest to *R. sulcatus* (Piaget, 1880) found on *Hydrophasianus chirurgus* (Scopoli). In the male,

the heavily sclerotized abdominal tergal and sternal plates are not as wide in *R. indicus* as in *R. sulcatus*. The mesosome of the male in *R. sulcatus* is much narrower than in *R. indicus*. In the female, the posterior margin of the vulva in *R. indicus* is normal, or without appendages found in *R. sulcatus*. In both sexes, the ventral chaetotaxy of the genital region is more dense in *R. indicus* than in *R. sulcatus*.

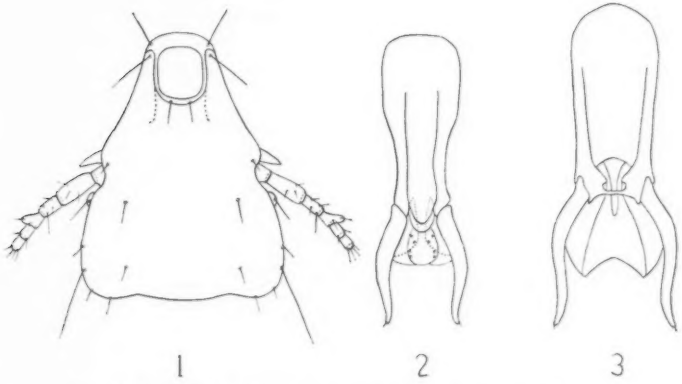


FIG. 1. *Rallicola indicus* n. sp., dorsal view of head, male.
FIG. 2. *Rallicola indicus* n. sp., male genitalia.
FIG. 3. *Rallicola unguiculatus* (Piaget, 1800), male genitalia.

Type host: Metopidius indicus (Latham).

Type material: Holotype male, *allotype* female and 30 *paratypes* in the U. S. National Museum collected on 15 December 1952 by Robert E. Elbel at Chaiyaphum, Phu Khieo, Ban Lat, THAILAND. The British Museum (Natural History) has 40 paratypes collected in March 1937 at Lucknow, India, and 21 paratypes collected on 1 January 1952 at Moraing, Manipur, India.

Rallicola unguiculatus (Piaget, 1880)

This species was described from specimens supposedly taken off "Eurylaimus cucullatus" from Sumatra. Clay noted "it is possible that *Eurylaimus* is not the true host." Large collections in Thailand from *Centropus sinensis intermedius* (Hume) have yielded specimens which appear to be this species. The male genitalia, of a specimen from this host, is shown in figure 3. Specimens from *Centropus bengalensis bengalensis* (Gmelin), also from Thailand, appear to be the same species. Therefore, it appears that the true host is a species of *Centropus*. Five species of *Centropus* are found on Sumatra. Since material from all of these hosts is not available for study, it is impossible to determine if only one species of *Rallicola* is found on all species of *Centropus*. In the meantime, it can be safely stated that the type host originally given is in error; and it should be *Centropus* sp.

LITERATURE CITED

CLAY, T. 1953. Revisions of the genera of Mallophaga. I. The *Rallicola*-complex. Proc. Zool. Soc. Lond. 123: 563–587.

Obituary

Professor Dr. HANS BISCHOFF, formerly curator of Hymenoptera in the Zoological Museum of the Humboldt University in Berlin, and one of the world's foremost hymenopterists, died on March 18, 1960, in the seventy-first year of his age, following a brief illness. Professor Bischoff was best known for his outstanding volume on the biology of the Hymenoptera. His most comprehensive taxonomic contribution was the voluminous monograph of the Mutillidae of Africa.

Fleas from the Kangaroo Rats of Northern California

By C. Andresen Hubbard, Tigard 23, Oregon

Just where is Northern California? Usually it is considered to be that part of the state in which the Cascade Mountains are found and one supposes the draws through which highways 299 and 36 extend, via the cities of Eureka, Douglas, Redding, Red Bluff, Chester, Susanville, Lichfield and Wendel and thence out through Flanigan, Nevada, mark the southern limits of northern California. This paper, then, concerns the fleas of the kangaroo rats north of these two highways.

It has been 20 years now since the writer published his first paper on western fleas. During these years he has studied most areas west of the Rocky Mountains with the exception of central and southern California where Gus Augustson, protege of the writer, has been doing a good job in this field.

But in 1953, while the writer was in Iraq on a Fulbright assignment, Augustson wrote in a paper entitled "The flea genus Meringis in California" (Bull. So. Calif. Acad. Sci., Vol. 52, part 3, page 111), "Hubbard reports (1947) this species (*Meringis parkeri*) from Modoc County (California) but in view of the specimens reported on below (*Meringis californicus*), his record of a single male may be questionable."

Had Augustson spent even a moment with the range maps on kangaroo rats in Hall's *Mammals of Nevada* (1946), and *Mammals of Oregon* by Bailey (1936) he would have realized that the Merriam and the giant desert kangaroo rats, *D. m. merriami* and *D. d. deserti* travel between Flanigan, Nevada, and Wendel, California, carrying with them always the fleas *Meringis parkeri, Meringis dipodomys* and *Trassis* (*Thrassoides*)*hoffmani;* that the Surprise Valley kangaroo rat, *D. m. aquilonius,* travels between Cedarville and Eagleville, California, and Sand Creek, Nevada, always carrying with it the flea *Meringis dipodomys* and possibly on occasion the fleas *Meringis parkeri* and *Thrassis* (*Thrassoides*) *hoffmani;* that the Northern California kangaroo rat *D. h. californicus* travels back and forth between Dorris,

California, and Worden and Klamath Falls, Oregon, and Tule Lake, California, and Swan Lake, Oregon, and Adel, Oregon, and Fort Bidwell, California, carrying with it always the flea *Meringis cummingi.* In none of these ways or routes is there the slightest terrain difficulty for the ingress or egress of kangaroo rats between northern California and Nevada or Oregon.

The kangaroo rat of northern California which has the greatest range is *Dipodomys merriami merriami,* the Merriam kangaroo rat. Described by Mearns in 1890 from central Arizona, this small dark colored kangaroo rat is found all over western Nevada and at the south tip of Pyramid Lake has its range deflected west to extend through Flanigan, Nevada, into California to be very plentiful about the city dump of Wendel. How far beyond the animal is found the writer does not know, but it is probably confined to Honey Lake Valley.

By working along the well graveled road extending between Wendel and Flanigan (25 miles) the following records were secured:

From *Dipodomys merriami merriami* Mearns (Merriam kangaroo rat), Off 7 hosts as follows: 0–5–0–15–8–1–35 = 63 at city dump, Wendel, Lassen Co., California, November 11, 1960,

Meringis parkeri Jordan 1937, 19 males, 25 females,
Thrassis (*Thrassoides*) *hoffmani* Hubbard 1949, 8 males, 11 females.

Off 4 hosts as follows: 0–6–0–2 = 8 from roadside ditch, 10 miles east of Wendel, California, at large ranch house, November 11, 1960,

Meringis dipodomys Kohls 1937, 4 males, 4 females.

Off 16 hosts as follows: 0–5–7–10–12–11–0–25–5–5–5–7–5–5–6–19 = 127 at 16 miles east of Wendel, California, November 11, 1960,

Meringis parkeri Jordan 1937, 38 males, 47 females,
Thrassis (*Thrassoides*) *hoffmani* Hubbard 1949, 21 pairs.

This section of the data brings up three interesting points. First Augustson should not have questioned the writer's earlier records since *Meringis parkeri* is here proved to be well established in northern California. Second, an academic point, how did *Dipodomys m. merriami* get across the Colorado River to

make its way eventually into California? The writer has no idea. Third, where does *Dipodomys m. merriami* pick up its heavy loads of *Meringis parkeri,* which is of course, the true flea of *Dipodomys ordii columbianus,* the Columbian kangaroo rat? Coming in from the south it should carry only *Meringis dipodomys.* The writer believes *Meringis parkeri* is picked up by Merriam's kangaroo rat from the Columbian kangaroo rat where they mix west of Pyramid Lake, Black Rock Desert and Smoke Creek Desert as the Columbian kangaroo rat has come down from Oregon, the state in which much of its range is found.

Largest of all of the western kangaroo rats, *Dipodomys deserti deserti,* the giant desert kangaroo rat, was described by Stephens in 1887 from the Mohave Desert in San Bernardino County, California. It ranges east into southern Nevada, then a good 700 miles to the north in western Nevada to the south end of Pyramid Lake where its range was thought to be deflected to the east but the records here offered show that the range is also deflected to the west, out through Flanigan, Nevada, and through the draw which goes to Wendel, California. These kangaroo rats are lovely, huge, silky, and a beautiful buff.

From work along the Wendel-Flanigan road the following records were secured:

From *Dipodomys deserti deserti* Stephens (giant desert kangaroo rat), Off 2 hosts as follows: 2–2 = 4 at 16 miles east of Wendel, California, November 11, 1960,
Meringis parkeri Jordan 1937, 3 males,
Thrassis (*Thrassoides*) *hoffmani* Hubbard 1949, 1 male.

This section of the data brings to the attention of mammologists that the range of the giant desert kangaroo rat is extended out of northern Nevada into California in the vicinity of Wendel.

The kangaroo rat of northern California with the smallest range is *Dipodomys microps aquilonius,* the Surprise Valley kangaroo rat described by Willets in 1939 from Cedarville, Modoc county, California. This dark colored fairly large kangaroo rat is plentiful about Cedarville, Eagleville, Bare Ranch, and is said to range as far south as Pyramid Lake, Nevada.

This range is about 200 miles long. The writer has taken this kangaroo rat in Surprise Valley for some years and found it always carrying the flea *Meringis dipodomys* with an occasional specimen of *Meringis parkeri.*

At the type locality for the kangaroo rat during October of 1960 the following records were secured:

From *Dipodomys microps aquilonius* Willets (Surprise Valley kangaroo rat), Off 9 hosts as follows: 1–2–4–6–1–0–14–4–4 = 36 at the sand dunes east of dry lake, 6 miles east of Cedarville, Modoc Co., California, October 16, 1960,
Meringis dipodomys Kohls 1937, 20 males, 16 females.

The fourth kangaroo rat found in northern California is *Dipodomys hermanni californicus,* the Northern California kangaroo rat described by Merriam in 1890 from Ukiah, Mendocino county, California. It is a fairly large kangaroo rat, and dark colored. It is the only one of the series, here offered, which has no contact with the southern forms so carries only its own flea, *Meringis cummingi.* In the some twenty or more years that the writer has been taking this fine animal in the Modoc Lava Beds of California and Swan Lake Valley of Oregon never has he taken strays or other kangaroo rat fleas off it.

From the type locality at Ukiah it ranges into northern California and is found in all kangaroo rat country in the north of the state to penetrate into Oregon at Klamath Falls, spread to the east finally to enter California again to be found in Surprise Valley at Fort Bidwell.

Working along the north boundary of the state, the writer secured these records:

From *Dipodomys hermanni californicus* Merriam (Northern California kangaroo rat), Off 1 host as follows: 2 at Petroglyph Point, Tule Lake, Modoc County, California, November 10, 1960,
Meringis cummingi C. Fox 1926, 1 male, 1 female.
Off 3 hosts as follows: 5–3–16 = 24 at 4 miles east of Modoc Lava Beds Headquarters from rock outcrops along road, Tule Lake, California, October 10, 1960,
M. cummingi C. Fox 1926, 12 males, 12 females.
Off 7 hosts as follows: 6–2–0–12–2–0–0 =22 at 3 miles northeast, Fort Bidwell, California, October 17, 1960,

M. cummingi C. Fox 1926, 11 pairs.
Off 2 hosts as follows 2–2 = 4 at 8 miles northeast of Fort Bidwell, California, rock outcrop on Fort Bidwell-Adel road, October 17, 1960,
M. cummingi C. Fox 1926, 4 males.

This section of the data brings to the attention of mammologists the extension of the range of this kangaroo rat by some 100 miles to the east to be recorded from Surprise Valley, Modoc county an area east of Warner Mountains from which it had not before been reported.

In a letter dated December 8, 1960, Dr. Seth Benson, mammologist at the University of California informs the writer that he and a field crew sampled this same Flanigan-Wendel area for kangaroo rats during the summer of 1960 and that during their work in this draw took the following five species; *D. deserti deserti, D. merriami merriami, D. microps aquilonius, D. panamintinus leucogenys* and *D. ordii columbianus.*

So one can say at this time, then, that the fifth kangaroo rat of northern California is *Dipodomys panamintinus leucogenys,* the Panamint kangaroo rat described by Grinnell during 1919 from materials taken in Mono county, California. Its range may be 200 miles long extending along the Nevada-California boundary 100 miles south and north of Lake Tahoe to enter northern California through the Flanigan-Wendel draw. In size this kangaroo rat is large, next to *D. deserti,* and is dark in color. In northern California it probably does not range out of Honey Lake Valley.

Coming in from the south as this animal does, it probably usually carries the fleas *Meringis dipodomys* and *Thrassis (Thrassoides) hoffmani* and because it associates in its northern range with *D. ordii* it would also carry an occasional *Meringis parkeri.*

The sixth of the kangaroo rats of northern California is *Dipodomys ordii columbianus,* the Columbian five-toed kangaroo rat described by Merriam during 1894 from specimens collected in Umatilla county, Oregon. This, the most northern of the kangaroo rats, is beautiful, medium sized, soft buff colored. It ranges in all kangaroo rat country of Oregon and to

the east, all over northern Nevada and from northwest Nevada into California to be found in many parts of Modoc county. This kangaroo rat always carries the flea *Meringis parkeri.*

The kangaroo rat fleas of northern California are then the following four.

Meringis parkeri was described by Dr. Karl Jordan of the British Museum, late dean of the world flea students, during 1937 from materials taken at Powderville, Montana. The writer has collected this flea in all the kangaroo rat country of Washington, Oregon, Idaho, Utah, and as far south as Carson City, Nevada, and again from northeast California. The flea's major host is the Columbian kangaroo rat. This is a flea of northern kangaroo rats.

Meringis dipodomys was described by Glenn Kohls of the Rocky Mountain Laboratory in 1938 from materials collected in Imperial and Inyo counties, California, off kangaroo rats. The writer has records for this flea from all over Nevada as far north now as Flanigan and Wendel and Cedarville, California. This is a flea of kangaroo rats of the southwest.

Meringis cummingi was described by Carol Fox in 1926 from a single male taken off a giant desert kangaroo rat taken in the vicinity of Los Angeles. The writer described the female during 1940 from materials taken off kangaroo rats captured in the Modoc Lava Beds of northern California. The writer has taken this flea throughout the entire portion of its northern range, its entire range seemingly to be central and northern California. The Northern California kangaroo rat seems to be its chief host.

Thrassis (*Thrassoides*) *hoffmani* was described by the writer during 1949 from materials taken off a giant desert kangaroo rat captured at Beatty, Nevada. This is a common winter flea of southwest kangaroo rats but the new data offered herewith extends the range northwards to Flanigan, Nevada, and northeast California.

It should be remembered by investigators in the field that during hot, dry late June, July, August, and early September few fleas are to be found on kangaroo rats but frequently during other seasons many can be collected from them.

Since Augustson in his paper of 1953 suggested that the writer's records of *Meringis parkeri* from northern California might be instead *Meringis californicus* the specimens of the November, 1960, catches were sent to Frans Smit of the British Museum who determined them as true *Meringis parkeri.*

The flea specimens involved in this paper are being sent for the most part to the United States National Museum and the British Museum with samples going to Public Health Service Laboratories in the west, museums of California, and of course to Mr. Augustson.

The host specimens here involved were shipped alive to Dr. Murray Johnson, surgeon of Tacoma, Washington, who acts by avocation as Curator of Mammals, University of Puget Sound, where he is working under a National Science Foundation grant on "serum protein and hemoglobin electrophoresis of mammals." Upon completion of these tests the host specimens are made into skins and added to the Museum collection where they can be viewed and studied.

This is the third of a series of papers on western fleas to be published by the writer under National Science Foundation Grant B8645.

Obituary

Dr. Bentley Ball Fulton, Professor Emeritus in Entomology at North Carolina State College, died December 8, 1960. Born in 1889 he attended Ohio State University, received his Master's degree from Chicago, and his Doctorate from Iowa State University. He served as entomologist at the State experiment stations in New York, Oregon and Iowa, after which, in 1928 he accepted a professorship at North Carolina. Dr. Fulton was known among other things for his original work in distinguishing species of crickets by their songs as well as by morphological characters.

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Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

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